

WHAT IS CLAIMED IS:

1. A method for use in a network management device for managing a plurality of network devices on a network, said method comprising the steps of:

detecting an address assignment message sent from an address server over the network to one of the plurality of network devices, the address assignment message containing an assigned address corresponding to the network device;

sending, in response to the detection of the address assignment message, an information request message over the network from the network management device to the network device, the information request message containing the assigned address corresponding to the network device;

receiving, in response to the information request message, information from the network device; and

creating an entry corresponding to the network device in a device management directory, the entry containing the assigned address corresponding to the network device and the information received from the network device.

2. A method according to Claim 1, wherein the plurality of network devices are network printers.

3. A method according to Claim 1, wherein the address assignment message is a DHCP message,

the address server is a DHCP server and the assigned address is an IP address.

5 4. A method according to Claim 3, wherein
the DHCP server is disposed in the network
management device and provides the detection of the
address assignment message.

10 5. A method according to Claim 1, wherein
the address assignment message is detected by a
listening module disposed in the network management
device.

15 6. A method according to Claim 1, wherein
the address assignment message further contains a
preset identification address corresponding to the
printing device.

20 7. A method according to Claim 6, wherein
in the sending step, the information request message
is only sent if the preset identification address of
the address assignment message is within a
predetermined range of identification addresses.

25 8. A method according to Claim 6, wherein
the preset identification address is a MAC address
and, in the detecting step, the address assignment
message is only detected if the MAC address is
within a predetermined range of MAC addresses.

30 9. A method according to Claim 2, further
comprising the step of initiating execution of a

virtual device module corresponding to the printing device, the virtual device module for extending the functional capabilities of the printing device.

5 10. A method according to Claim 9, further comprising the step of initiating execution of a functional application module for interfacing with the virtual device module for utilizing an extended functional capability of the network device.

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 11. A method according to Claim 10, wherein the functional application module is a print job accounting application module.

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 12. A method according to Claim 10, wherein the functional application module is a print job policy management application module.

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 13. A method according to Claim 10, wherein the functional application module is a printing device management application module.

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 14. A method according to Claim 10, wherein the functional application module is a printing device driver utility.

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 15. A method according to Claim 10, wherein the functional application module is a secure print job application module.

 16. A method according to Claim 1, further comprising the step of publishing the presence of

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the network management device to a plurality of workstations on the network.

5 17. A method according to Claim 16, wherein the network management device is published as a print server for each network device having an entry in the device management directory.

10 18. A method according to Claim 2, further comprising the steps of creating a print queue for each printing device having an entry in the device management directory and publishing each respective print queue to a plurality of workstations on the network.

15 19. A method according to Claim 18, further comprising the steps of receiving a print job from one of the workstations, the print job being directed to one of the print queues,
20 submitting the print job to the corresponding print queue, and sending the print job from the print queue to the printing device corresponding to the print queue.

25 20. A method according to Claim 1, wherein the network management device includes a web server which provides a network configuration web page for access by at least one workstation having a connection with the network management device, the
30 network configuration web page containing a user interface for management of the network management

device and of each network device having an entry in the device management directory.

5 21. A method according to Claim 1, wherein the network management device includes a user interface panel for management of the network management device and of each network device having an entry in the device management directory.

10 22. A method according to Claim 13, wherein the printing device management application module supports a user interface display on a workstation having a connection with the network management device, the user interface for management
15 of the network management device and of each printing device having an entry in the device management directory.

20 23. A method according to Claim 1, wherein the network is a local network, wherein the network management device has a first interface card which connects the network management device to the plurality of network devices via the local network, and has a second interface card which connects the
25 network management device to a main network.

30 24. A method according to Claim 23, wherein at least one network server and at least one network computing device are connected to the main network, and wherein the network server and the network computing device can communicate with the

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38. A method according to Claim 28,
wherein the network management device creates and
maintains a plurality of print queues corresponding
to a determined subset of the plurality of printing
5 devices, and wherein the second network management
device creates and maintains a plurality of print
queues corresponding to the remaining ones of the
plurality of printing devices.

10 39. A method according to Claim 38,
wherein the determined subset is determined based on
a resource availability indicator for each of the
network management devices.

15 40. A method according to Claim 28,
wherein the network management device instructs the
second network management device via the main
network to disable a capability of the second
network management device to send and detect address
20 assignment messages.

41. A method according to Claim 23,
wherein a plurality of network management devices
are connected to the main network via a first
25 interface card in each respective network management
device, and wherein each respective network
management device is connected to a separate
plurality of network devices on a separate local
network via a second interface card.

30 42. A method according to Claim 41,
wherein a designated one of the plurality of network

management devices collects information from each of
the other network management devices regarding a set
of functional services that each network management
device supports for each of the separate plurality
5 of network devices connected to the respective
network management device.

43. A method according to Claim 42,
wherein the designated network management device
10 generates a global functional services directory
based on the collected information.

44. A method according to Claim 31,
wherein the master network management device
15 collects information from the slave network
management device regarding a set of functional
services that the slave network management device
supports for each of the plurality of network
devices.

45. A method according to Claim 44,
wherein the master network management device
generates a local functional services directory
based on the collected information from the slave
20 network management device and based on information
regarding a set of functional services that the
master network management device supports for each
of the plurality of network devices.

46. A method for use in a network
30 management device for managing a plurality of

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network printers on a network, said method
comprising the steps of:

5 receiving an address request message from
one of the plurality of network printers, the
address request message containing a MAC address
corresponding to the network printer;

10 sending an address assignment message from
an address server in the network management device
over the network to the network printer, the address
assignment message containing the MAC address and an
assigned IP address corresponding to the network
printer;

15 notifying a discovery module in the network
management device of the assigned IP address of the
network printer;

determining, in the discovery module, if
the MAC address of the network printer is within a
predetermined range of MAC addresses;

20 sending, in the case that the MAC address
of the network printer is within the predetermined
range of MAC addresses, an information request
message from the discovery module over the network
to the network printer, the information request
message containing the assigned IP address
25 corresponding to the network printer;

30 receiving, in the case that the MAC address
of the network printer is within the predetermined
range of MAC addresses, information from the network
printer in response to the information request
message; and

creating, in the case that the MAC address
of the network printer is within the predetermined

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range of MAC addresses, an entry corresponding to the network printer in a device management directory, the entry containing the MAC address and the assigned IP address corresponding to the network printer, and containing the information received from the network printer.

47. A network management device for managing a plurality of network devices on a network, said computing device comprising:

a program memory for storing process steps executable to perform the steps of (a) detecting an address assignment message sent from an address server over the network to one of the plurality of network devices, the address assignment message containing an assigned address corresponding to the network device, (b) sending, in response to the detection of the address assignment message, an information request message over the network from the network management device to the network device, the information request message containing the assigned address corresponding to the network device, (c) receiving, in response to the information request message, information from the network device, and (d) creating an entry corresponding to the network device in a device management directory, the entry containing the assigned address corresponding to the network device and the information received from the network device; and

a processor for executing the process steps stored in said program memory.

48. A network management device according to Claim 47, wherein the plurality of network devices are network printers.

5 49. A network management device according to Claim 47, wherein the address assignment message is a DHCP message, the address server is a DHCP server and the assigned address is an IP address.

10 50. A network management device according to Claim 49, wherein the DHCP server is disposed in the network management device and provides the detection of the address assignment message.

15 51. A network management device according to Claim 47, wherein the address assignment message is detected by a listening module disposed in the network management device.

20 52. A network management device according to Claim 47, wherein the address assignment message further contains a preset identification address corresponding to the printing device.

25 53. A network management device according to Claim 52, wherein in the sending step, the information request message is only sent if the preset identification address of the address assignment message is within a predetermined range
30 of identification addresses.

54. A network management device according to Claim 52, wherein the preset identification address is a MAC address and, in the detecting step, the address assignment message is only detected if the MAC address is within a predetermined range of MAC addresses.

55. A network management device according to Claim 48, further comprising the step of initiating execution of a virtual device module corresponding to the printing device, the virtual device module for extending the functional capabilities of the printing device.

56. A network management device according to Claim 55, further comprising the step of initiating execution of a functional application module for interfacing with the virtual device module for utilizing an extended functional capability of the network device.

57. A network management device according to Claim 56, wherein the functional application module is a print job accounting application module.

58. A network management device according to Claim 56, wherein the functional application module is a print job policy management application module.

59. A network management device according to Claim 56, wherein the functional application

module is a printing device management application module.

5 60. A network management device according to Claim 56, wherein the functional application module is a printing device driver utility.

10 61. A network management device according to Claim 56, wherein the functional application module is a secure print job application module.

15 62. A network management device according to Claim 47, further comprising the step of publishing the presence of the network management device to a plurality of workstations on the network.

20 63. A network management device according to Claim 62, wherein the network management device is published as a print server for each network device having an entry in the device management directory.

25 64. A network management device according to Claim 48, further comprising the steps of creating a print queue for each printing device having an entry in the device management directory and publishing each respective print queue to a plurality of workstations on the network.

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65. A network management device according to Claim 64, further comprising the steps of

receiving a print job from one of the workstations,
the print job being directed to one of the print
queues, submitting the print job to the
corresponding print queue, and sending the print job
5 from the print queue to the printing device
corresponding to the print queue.

66. A network management device according
to Claim 47, wherein the network management device
10 includes a web server which provides a network
configuration web page for access by at least one
workstation having a connection with the network
management device, the network configuration web
page containing a user interface for management of
15 the network management device and of each network
device having an entry in the device management
directory.

67. A network management device according
to Claim 47, wherein the network management device
20 includes a user interface panel for management of
the network management device and of each network
device having an entry in the device management
directory.

68. A network management device according
to Claim 59, wherein the printing device management
application module supports a user interface display
on a workstation having a connection with the
25 network management device, the user interface for
30 management of the network management device and of

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each printing device having an entry in the device management directory.

5 69. A network management device according to Claim 47, wherein the network is a local network, wherein the network management device has a first interface card which connects the network management device to the plurality of network devices via the local network, and has a second interface card which
10 connects the network management device to a main network.

15 70. A network management device according to Claim 69, wherein at least one network server and at least one network computing device are connected to the main network, and wherein the network server and the network computing device can communicate with the plurality of network devices only through the network management device.

20 71. A network management device according to Claim 69, wherein the address assignment message is a DHCP message, the address server is a DHCP server provided in the network management device,
25 and the assigned address is a local IP address for use on the local network only.

30 72. A network management device according to Claim 69, wherein the plurality of network devices are network printers, and further comprising the steps of creating a print queue for each printing device having an entry in the device

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management directory and publishing each respective print queue to a plurality of workstations on the main network.

5 73. A network management device according to Claim 72, further comprising the steps of receiving a print job over the main network from one of the workstations, the print job being directed to an identified one of the print queues, submitting
10 the print job to the identified print queue, and sending the print job from the identified print queue over the local network to the printing device associated with the identified print queue.

15 74. A network management device according to Claim 69, wherein a second network management device having first and second interface cards is connected to the plurality of network devices on the local network via the first interface card, and is
20 connected to the main network via the second interface card.

25 75. A network management device according to Claim 69, wherein at least one additional network management device having first and second interface cards is connected to a second plurality of network devices on a second local network via the first interface card, and is connected to the main network via the second interface card.

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 76. A network management device according to Claim 75, wherein each network management device

5 sends an announcement message over the main network
for detection by the other network management
device, whereby each network management device
detects the presence of the other network management
device.

10 77. A network management device according
to Claim 76, wherein one of the network management
devices is designated as a master network management
device and the at least one other network management
device is designated as a slave network management
device.

15 78. A network management device according
to Claim 77, wherein the master network management
device obtains a copy of the device management
directory from the slave network management device.

20 79. A network management device according
to Claim 78, wherein only the master network
management device supports a user interface for
management of the master network management device,
the slave network management device and all network
devices having entries in the respective device
25 management directories of each network management
device.

30 80. A network management device according
to Claim 78, wherein each network management device
on the network supports a user interface for
obtaining information and managing the particular
network management device and all network devices

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81. A network management device according
5 to Claim 78, wherein the master network management
device creates a combined device management
directory containing entries from the device
management directory of the master network
management device and from the device management
10 directory of the slave network management device.

82. A network management device according to Claim 81, wherein the master network management device sends a backup copy of the combined device management directory to the slave network management device.

83. A network management device according to Claim 82, wherein, in the case of failure of the master network management device, the slave network management device is re-designated as the master network management device.

25 84. A network management device according
to Claim 74, wherein the network management device
creates and maintains a plurality of print queues
corresponding to a determined subset of the
plurality of printing devices, and wherein the
second network management device creates and
30 maintains a plurality of print queues corresponding
to the remaining ones of the plurality of printing
devices.

85. A network management device according to Claim 84, wherein the determined subset is determined based on a resource availability indicator for each of the network management devices.

86. A network management device according to Claim 74, wherein the network management device instructs the second network management device via the main network to disable a capability of the second network management device to send and detect address assignment messages.

87. A network management device according to Claim 69, wherein a plurality of network management devices are connected to the main network via a first interface card in each respective network management device, and wherein each respective network management device is connected to a separate plurality of network devices on a separate local network via a second interface card.

88. A network management device according to Claim 87, wherein a designated one of the plurality of network management devices collects information from each of the other network management devices regarding a set of functional services that each network management device supports for each of the separate plurality of network devices connected to the respective network management device.

89. A network management device according to Claim 88, wherein the designated network management device generates a global functional services directory based on the collected information.

90. A network management device according to Claim 77, wherein the master network management device collects information from the slave network management device regarding a set of functional services that the slave network management device supports for each of the plurality of network devices.

91. A network management device according to Claim 90, wherein the master network management device generates a local functional services directory based on the collected information from the slave network management device and based on information regarding a set of functional services that the master network management device supports for each of the plurality of network devices.

92. Computer-executable process steps stored on a computer readable medium, said computer-executable process steps for managing a plurality of network devices on a network by a network management device, said computer-executable process steps comprising the steps of:

a detection step of detecting an address assignment message sent from an address server over the network to one of the plurality of network

devices, the address assignment message containing an assigned address corresponding to the network device;

5 a sending step of sending, in response to the detection of the address assignment message, an information request message over the network from the network management device to the network device, the information request message containing the assigned address corresponding to the network
10 device;

a receiving step of receiving, in response to the information request message, information from the network device; and

15 a creating step of creating an entry corresponding to the network device in a device management directory, the entry containing the assigned address corresponding to the network device and the information received from the network device.
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93. Computer-executable process steps according to Claim 92, wherein the plurality of network devices are network printers.

25 94. Computer-executable process steps according to Claim 92, wherein the address assignment message is a DHCP message, the address server is a DHCP server and the assigned address is an IP address.
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95. Computer-executable process steps according to Claim 94, wherein the DHCP server is

disposed in the network management device and provides the detection of the address assignment message.

5 96. Computer-executable process steps according to Claim 92, wherein the address assignment message is detected by a listening module disposed in the network management device.

10 97. Computer-executable process steps according to Claim 92, wherein the address assignment message further contains a preset identification address corresponding to the printing device.

15 98. Computer-executable process steps according to Claim 97, wherein in the sending step, the information request message is only sent if the preset identification address of the address
20 assignment message is within a predetermined range of identification addresses.

 99. Computer-executable process steps according to Claim 97, wherein the preset
25 identification address is a MAC address and, in the detecting step, the address assignment message is only detected if the MAC address is within a predetermined range of MAC addresses.

30 100. Computer-executable process steps according to Claim 93, further comprising the step of initiating execution of a virtual device module

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5 101. Computer-executable process steps
according to Claim 100, further comprising the step
of initiating execution of a functional application
module for interfacing with the virtual device
module for utilizing an extended functional
10 capability of the network device.

102. Computer-executable process steps
according to Claim 101, wherein the functional
application module is a print job accounting
application module.

103. Computer-executable process steps
according to Claim 101, wherein the functional
application module is a print job policy management
application module.

104. Computer-executable process steps according to Claim 101, wherein the functional application module is a printing device management application module.

105. Computer-executable process steps
according to Claim 101, wherein the functional
application module is a printing device driver
utility.

106. Computer-executable process steps according to Claim 101, wherein the functional application module is a secure print job application module.

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107. Computer-executable process steps according to Claim 92, further comprising the step of publishing the presence of the network management device to a plurality of workstations on the network.

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108. Computer-executable process steps according to Claim 107, wherein the network management device is published as a print server for each network device having an entry in the device management directory.

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109. Computer-executable process steps according to Claim 93, further comprising the steps of creating a print queue for each printing device having an entry in the device management directory and publishing each respective print queue to a plurality of workstations on the network.

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110. Computer-executable process steps according to Claim 109, further comprising the steps of receiving a print job from one of the workstations, the print job being directed to one of the print queues, submitting the print job to the corresponding print queue, and sending the print job from the print queue to the printing device corresponding to the print queue.

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network devices via the local network, and has a second interface card which connects the network management device to a main network.

5 115. Computer-executable process steps
according to Claim 114, wherein at least one network
server and at least one network computing device are
connected to the main network, and wherein the
network server and the network computing device can
10 communicate with the plurality of network devices
only through the network management device.

116. Computer-executable process steps
according to Claim 114, wherein the address
15 assignment message is a DHCP message, the address
server is a DHCP server provided in the network
management device, and the assigned address is a
local IP address for use on the local network only.

20 117. Computer-executable process steps
according to Claim 114, wherein the plurality of
network devices are network printers, and further
comprising the steps of creating a print queue for
each printing device having an entry in the device
25 management directory and publishing each respective
print queue to a plurality of workstations on the
main network.

30 118. Computer-executable process steps
according to Claim 117, further comprising the steps
of receiving a print job over the main network from
one of the workstations, the print job being

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directed to an identified one of the print queues,
submitting the print job to the identified print
queue, and sending the print job from the identified
print queue over the local network to the printing
device associated with the identified print queue.

119. Computer-executable process steps
according to Claim 114, wherein a second network
management device having first and second interface
cards is connected to the plurality of network
devices on the local network via the first interface
card, and is connected to the main network via the
second interface card.

120. Computer-executable process steps
according to Claim 114, wherein at least one
additional network management device having first
and second interface cards is connected to a second
plurality of network devices on a second local
network via the first interface card, and is
connected to the main network via the second
interface card.

121. Computer-executable process steps
according to Claim 120, wherein each network
management device sends an announcement message over
the main network for detection by the other network
management device, whereby each network management
device detects the presence of the other network
management device.

122. Computer-executable process steps
according to Claim 121, wherein one of the network
management devices is designated as a master network
management device and the at least one other network
5 management device is designated as a slave network
management device.

123. Computer-executable process steps
according to Claim 122, wherein the master network
10 management device obtains a copy of the device
management directory from the slave network
management device.

124. Computer-executable process steps
15 according to Claim 123, wherein only the master
network management device supports a user interface
for management of the master network management
device, the slave network management device and all
network devices having entries in the respective
20 device management directories of each network
management device.

125. Computer-executable process steps
according to Claim 123, wherein each network
25 management device on the network supports a user
interface for obtaining information and managing the
particular network management device and all network
devices having entries in the respective device
management directories of all network management
30 devices.

126. Computer-executable process steps according to Claim 123, wherein the master network management device creates a combined device management directory containing entries from the device management directory of the master network management device and from the device management directory of the slave network management device.

127. Computer-executable process steps according to Claim 126, wherein the master network management device sends a backup copy of the combined device management directory to the slave network management device.

128. Computer-executable process steps according to Claim 127, wherein, in the case of failure of the master network management device, the slave network management device is re-designated as the master network management device.

129. Computer-executable process steps according to Claim 119, wherein the network management device creates and maintains a plurality of print queues corresponding to a determined subset of the plurality of printing devices, and wherein the second network management device creates and maintains a plurality of print queues corresponding to the remaining ones of the plurality of printing devices.

130. Computer-executable process steps according to Claim 129, wherein the determined

subset is determined based on a resource availability indicator for each of the network management devices.

5 131. Computer-executable process steps
according to Claim 119, wherein the network
management device instructs the second network
management device via the main network to disable a
capability of the second network management device
10 to send and detect address assignment messages.

15 132. Computer-executable process steps
according to Claim 114, wherein a plurality of
network management devices are connected to the main
network via a first interface card in each
respective network management device, and wherein
each respective network management device is
connected to a separate plurality of network devices
on a separate local network via a second interface
20 card.

25 133. Computer-executable process steps
according to Claim 132, wherein a designated one of
the plurality of network management devices collects
information from each of the other network
management devices regarding a set of functional
services that each network management device
supports for each of the separate plurality of
network devices connected to the respective network
30 management device.

134. Computer-executable process steps according to Claim 133, wherein the designated network management device generates a global functional services directory based on the collected information.

135. Computer-executable process steps according to Claim 122, wherein the master network management device collects information from the slave network management device regarding a set of functional services that the slave network management device supports for each of the plurality of network devices.

136. Computer-executable process steps according to Claim 135, wherein the master network management device generates a local functional services directory based on the collected information from the slave network management device and based on information regarding a set of functional services that the master network management device supports for each of the plurality of network devices.

137. A computer-readable medium which stores computer-executable process steps, the computer-executable process steps to manage a plurality of network devices on a network by a network management device, said computer-executable process steps comprising:

a detection step of detecting an address assignment message sent from an address server over

the network to one of the plurality of network devices, the address assignment message containing an assigned address corresponding to the network device;

5 a sending step of sending, in response to the detection of the address assignment message, an information request message over the network from the network management device to the network device, the information request message containing the
10 assigned address corresponding to the network device;

 a receiving step of receiving, in response to the information request message, information from the network device; and

15 a creating step of creating an entry corresponding to the network device in a device management directory, the entry containing the assigned address corresponding to the network device and the information received from the network
20 device.

138. A computer-readable medium according to Claim 137, wherein the plurality of network devices are network printers.

25 139. A computer-readable medium according to Claim 137, wherein the address assignment message is a DHCP message, the address server is a DHCP server and the assigned address is an IP address.

30 140. A computer-readable medium according to Claim 139, wherein the DHCP server is disposed in

the network management device and provides the detection of the address assignment message.

141. A computer-readable medium according to Claim 137, wherein the address assignment message is detected by a listening module disposed in the network management device.

142. A computer-readable medium according to Claim 137, wherein the address assignment message further contains a preset identification address corresponding to the printing device.

143. A computer-readable medium according to Claim 142, wherein in the sending step, the information request message is only sent if the preset identification address of the address assignment message is within a predetermined range of identification addresses.

144. A computer-readable medium according to Claim 142, wherein the preset identification address is a MAC address and, in the detecting step, the address assignment message is only detected if the MAC address is within a predetermined range of MAC addresses.

145. A computer-readable medium according to Claim 138, further comprising the step of initiating execution of a virtual device module corresponding to the printing device, the virtual

device module for extending the functional capabilities of the printing device.

146. A computer-readable medium according to Claim 145, further comprising the step of initiating execution of a functional application module for interfacing with the virtual device module for utilizing an extended functional capability of the network device.

147. A computer-readable medium according to Claim 146, wherein the functional application module is a print job accounting application module.

148. A computer-readable medium according to Claim 146, wherein the functional application module is a print job policy management application module.

149. A computer-readable medium according to Claim 146, wherein the functional application module is a printing device management application module.

150. A computer-readable medium according to Claim 146, wherein the functional application module is a printing device driver utility.

151. A computer-readable medium according to Claim 146, wherein the functional application module is a secure print job application module.

152. A computer-readable medium according to Claim 137, further comprising the step of publishing the presence of the network management device to a plurality of workstations on the network.

153. A computer-readable medium according to Claim 152, wherein the network management device is published as a print server for each network device having an entry in the device management directory.

154. A computer-readable medium according to Claim 138, further comprising the steps of creating a print queue for each printing device having an entry in the device management directory and publishing each respective print queue to a plurality of workstations on the network.

155. A computer-readable medium according to Claim 154, further comprising the steps of receiving a print job from one of the workstations, the print job being directed to one of the print queues, submitting the print job to the corresponding print queue, and sending the print job from the print queue to the printing device corresponding to the print queue.

156. A computer-readable medium according to Claim 137, wherein the network management device includes a web server which provides a network configuration web page for access by at least one

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workstation having a connection with the network management device, the network configuration web page containing a user interface for management of the network management device and of each network device having an entry in the device management directory.

157. A computer-readable medium according to Claim 137, wherein the network management device includes a user interface panel for management of the network management device and of each network device having an entry in the device management directory.

158. A computer-readable medium according to Claim 149, wherein the printing device management application module supports a user interface display on a workstation having a connection with the network management device, the user interface for management of the network management device and of each printing device having an entry in the device management directory.

159. A computer-readable medium according to Claim 137, wherein the network is a local network, wherein the network management device has a first interface card which connects the network management device to the plurality of network devices via the local network, and has a second interface card which connects the network management device to a main network.

160. A computer-readable medium according to Claim 159, wherein at least one network server and at least one network computing device are connected to the main network, and wherein the network server and the network computing device can communicate with the plurality of network devices only through the network management device.

161. A computer-readable medium according to Claim 159, wherein the address assignment message is a DHCP message, the address server is a DHCP server provided in the network management device, and the assigned address is a local IP address for use on the local network only.

162. A computer-readable medium according to Claim 159, wherein the plurality of network devices are network printers, and further comprising the steps of creating a print queue for each printing device having an entry in the device management directory and publishing each respective print queue to a plurality of workstations on the main network.

163. A computer-readable medium according to Claim 162, further comprising the steps of receiving a print job over the main network from one of the workstations, the print job being directed to an identified one of the print queues, submitting the print job to the identified print queue, and sending the print job from the identified print

queue over the local network to the printing device associated with the identified print queue.

164. A computer-readable medium according to Claim 159, wherein a second network management device having first and second interface cards is connected to the plurality of network devices on the local network via the first interface card, and is connected to the main network via the second interface card.

165. A computer-readable medium according to Claim 159, wherein at least one additional network management device having first and second interface cards is connected to a second plurality of network devices on a second local network via the first interface card, and is connected to the main network via the second interface card.

166. A computer-readable medium according to Claim 165, wherein each network management device sends an announcement message over the main network for detection by the other network management device, whereby each network management device detects the presence of the other network management device.

167. A computer-readable medium according to Claim 166, wherein one of the network management devices is designated as a master network management device and the at least one other network management

device is designated as a slave network management device.

5 168. A computer-readable medium according to Claim 167, wherein the master network management device obtains a copy of the device management directory from the slave network management device.

10 169. A computer-readable medium according to Claim 168, wherein only the master network management device supports a user interface for management of the master network management device, the slave network management device and all network devices having entries in the respective device management directories of each network management device.

15 170. A computer-readable medium according to Claim 168, wherein each network management device on the network supports a user interface for obtaining information and managing the particular network management device and all network devices having entries in the respective device management directories of all network management devices.

20 171. A computer-readable medium according to Claim 168, wherein the master network management device creates a combined device management directory containing entries from the device management directory of the master network management device and from the device management directory of the slave network management device.

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172. A computer-readable medium according to Claim 171, wherein the master network management device sends a backup copy of the combined device management directory to the slave network management device.

173. A computer-readable medium according to Claim 172, wherein, in the case of failure of the master network management device, the slave network management device is re-designated as the master network management device.

174. A computer-readable medium according to Claim 164, wherein the network management device creates and maintains a plurality of print queues corresponding to a determined subset of the plurality of printing devices, and wherein the second network management device creates and maintains a plurality of print queues corresponding to the remaining ones of the plurality of printing devices.

175. A computer-readable medium according to Claim 174, wherein the determined subset is determined based on a resource availability indicator for each of the network management devices.

176. A computer-readable medium according to Claim 164, wherein the network management device instructs the second network management device via the main network to disable a capability of the

second network management device to send and detect address assignment messages.

177. A computer-readable medium according to Claim 159, wherein a plurality of network management devices are connected to the main network via a first interface card in each respective network management device, and wherein each respective network management device is connected to a separate plurality of network devices on a separate local network via a second interface card.

178. A computer-readable medium according to Claim 177, wherein a designated one of the plurality of network management devices collects information from each of the other network management devices regarding a set of functional services that each network management device supports for each of the separate plurality of network devices connected to the respective network management device.

179. A computer-readable medium according to Claim 178, wherein the designated network management device generates a global functional services directory based on the collected information.

180. A computer-readable medium according to Claim 167, wherein the master network management device collects information from the slave network management device regarding a set of functional

services that the slave network management device supports for each of the plurality of network devices.

5 181. A computer-readable medium according to Claim 180, wherein the master network management device generates a local functional services directory based on the collected information from the slave network management device and based on
10 information regarding a set of functional services that the master network management device supports for each of the plurality of network devices.

15 182. A network management device for managing a plurality of network printers on a network, said computing device comprising:

20 a program memory for storing process steps executable to perform the steps of (a) receiving an address request message from one of the plurality of network printers, the address request message containing a MAC address corresponding to the network printer, (b) sending an address assignment message from an address server in the network management device over the network to the network
25 printer, the address assignment message containing the MAC address and an assigned IP address corresponding to the network printer, (c) notifying a discovery module in the network management device of the assigned IP address of the network printer,
30 (d) determining, in the discovery module, if the MAC address of the network printer is within a predetermined range of MAC addresses, (e) sending,

in the case that the MAC address of the network printer is within the predetermined range of MAC addresses, an information request message from the discovery module over the network to the network printer, the information request message containing the assigned IP address corresponding to the network printer, (f) receiving, in the case that the MAC address of the network printer is within the predetermined range of MAC addresses, information from the network printer in response to the information request message, and (g) creating, in the case that the MAC address of the network printer is within the predetermined range of MAC addresses, an entry corresponding to the network printer in a device management directory, the entry containing the MAC address and the assigned IP address corresponding to the network printer, and containing the information received from the network printer; and

a processor for executing the process steps stored in said program memory.

183. Computer-executable process steps stored on a computer readable medium, said computer-executable process steps for managing a plurality of network printers on a network by a network management device, said computer-executable process steps comprising the steps of:

a first receiving step of receiving an address request message from one of the plurality of network printers, the address request message

containing a MAC address corresponding to the network printer;

5 a first sending step of sending an address assignment message from an address server in the network management device over the network to the network printer, the address assignment message containing the MAC address and an assigned IP address corresponding to the network printer;

10 a notifying step of notifying a discovery module in the network management device of the assigned IP address of the network printer;

15 a determining step of determining, in the discovery module, if the MAC address of the network printer is within a predetermined range of MAC addresses;

20 a second sending step of sending, in the case that the MAC address of the network printer is within the predetermined range of MAC addresses, an information request message from the discovery module over the network to the network printer, the information request message containing the assigned IP address corresponding to the network printer;

25 a second receiving step of receiving, in the case that the MAC address of the network printer is within the predetermined range of MAC addresses, information from the network printer in response to the information request message; and

30 a creating step of creating, in the case that the MAC address of the network printer is within the predetermined range of MAC addresses, an entry corresponding to the network printer in a device management directory, the entry containing

